



A REVISION OF THE MONAXONID SPECIES DESCRIBED AS NEW IN LENDENFELD'S "CATALOGUE OF THE SPONGES IN THE AUSTRALIAN MUSEUM." Part ii.

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(Plates xv.-xxiv.)

Familia HOMORRHAPHIDÆ.

Subfamilia RENIERINÆ.

RENIERA COLLECTRIX.

For various reasons one is obliged to conclude that this species was founded on specimens of *Chondrosia* (?) *collectrix*, the mistake in all probability having been due to the fact that the specimen examined by Lendenfeld for description happened to contain a considerable number of foreign spicules derived from a *Reniera* growing in contact with it. This, in the first place, is the conclusion to be drawn from the ostensible type-specimen, as well as from a fragment labelled *Reniera collectrix* that comes from the British Museum,—both of which are examples of the species I have named. The fragment referred to is practically free from spicules, but the complete specimen (which is encrusted in many places by other sponges, including *Reniera*) shows here and there—as already mentioned by Whitelegge(56), who himself regarded them as proper to the sponge—patches of small oxea, which occur more especially in some parts near the surface. Furthermore, this specimen, apart from the fact of its being without proper spicules, is consistent with the description of *Reniera collectrix* in every respect excepting only that its oscula are but 2.5mm. wide instead of 5mm. And a point particularly to be noted in connection with the description is the statement therein

that the consistency of the sponge is very hard; for this in itself is an indication that the species described was not a *Reniera*. Finally, some significance attaches to the fact that although the specimen in question was undoubtedly known to Lendenfeld,—as is shown by its having a label written by him attached to it—he omitted to take it into account in his description of *Chondrosia collectrix*, which he states to be an “incrusting” sponge, attaining only “a height of 20mm., and a breadth of 60mm.”; and thus it seems certain that the real identity of this specimen was unsuspected. Accordingly, although it is difficult to believe that *Chondrosia* (?) *collectrix* could under any circumstances be mistaken for a species of *Reniera*, all the evidence supports the view that such a mistake was actually made.

RENIERA AUSTRALIS. (Text-fig.2).

*Introductory.*—The type specimen, which is preserved in alcohol, has the form of a thick layer covering one side of a piece of blackish wood, which has imparted to the sponge a brown stain. Although at first sight not appearing so, it consists of two specimens united laterally, one of which has grown over the edge of the other in such a way as to produce an appearance of continuity. Both specimens are generically the same—*Reniera*; but one of them has a rugged and granular surface, a somewhat olive-brown colour, and spicules measuring 80 to 125  $\mu$  in length by 5  $\mu$  in maximum stoutness; while the other, which is the smaller, has a smooth surface, a yellowish



Fig.2.—*Reniera australis*. Oxea.

to faintly reddish-brown colour, and spicules measuring 60 to (rarely) 115  $\mu$  in length by at most 4.5  $\mu$  in diameter. And there is also, apparently, a slight difference between them with regard to the mode of arrangement of the skeleton. It is not unlikely that the two are specifically distinct; and I, therefore, take the latter to be the representative of the species, since it agrees the better with

Lendenfeld's description. As this, the only specimen available, is small, incomplete, and much damaged, it unfortunately affords but little information regarding the external features of the species; and with respect to these, accordingly, I can only quote the original description, which was based apparently upon several specimens.

*Description.*—“Massive, lobose, horizontally extended, more or less incrusting sponges, with dome-shaped protuberances on the upper surface, on the summits of which the circular, 3 to 5mm. wide, oscula are situated. Surface smooth. The sponge attains a height of 30mm., a length of 150 to 200mm., and a width of 100mm. Colour in the living state rosy red, in spirit grey.” The consistency is soft and fragile, and the texture slightly porous. A very thin and delicate, non-separable, dermal membrane is present, and when this is removed (by cutting a thin shaving from the surface) the structure immediately beneath is seen to be minutely and irregularly honeycomb-like.

The skeleton-reticulation (as it appears in rather thin sections) does not extend continuously, as is perhaps usually the case in *Reniera*, but is interrupted by many wider or narrower gaps in which there occur only a comparatively few scattered spicules. The pattern of the reticulation is very irregular. Main fibres, 3 to 5 spicules broad, usually not traceable for any considerable distance and not disposed in orderly parallelism with one another, run at varying distances apart in a general surfaceward direction; and between these, in addition to some inter-reticulating, 2 to 3 spicules broad, connecting fibres, is a unispicular meshwork, the meshes of which, for the most part, are formed not of spicules placed end to end, but of intercrossing spicules. A noteworthy feature of the skeleton, though one which perhaps is not uncommon in *Reniera*, is the occurrence here and there, only at irregular and very wide intervals, of broad strings of loosely associated parallel spicules, which appear to be without relation to the rest of the skeleton or to one another, and run in various directions

through the sponge; they are variable (20 to 100  $\mu$ ) in width, and their spicules—as are also the scattered spicules of the skeleton—are shorter and slenderer than most of those composing the reticulation. Strings of spicules analogous to these are met with in *Tedania* and *Hemitedania*. The dermal skeleton is an irregular polygonal reticulation of pauciserial fibres, the meshes of which average about 120  $\mu$  in width.

The oxea are slightly curved, gradually sharp-pointed, and measure 60 to 115  $\mu$  in length by 4.5  $\mu$  in stoutness.

The flagellated chambers are spheroidal, and closely arranged; they measure about 40  $\mu$  in diameter. The nuclei of the choanocytes are large, averaging slightly more than 2.5  $\mu$  in diameter.

*Loc.*—Port Jackson.

*Remarks.*—Under the name *Reniera australis*, Whitelegge(53) has recorded several specimens from Funafuti which, in my opinion, after examination of the original preparations, belong to two different species both distinct from the sponge described above. In one of these species, the skeleton consists of a unispicular reticulation and of scattered foreign particles; while, in the other, the spicules do not form a meshwork at all, but are disposed in a quite irregular halichondroid fashion. The oxea in both species attain a length of between 130 and 140  $\mu$ .

Dragnewitsch(16), in a paper which I have not seen, has also recorded as *Reniera australis* Lendenfeld, a sponge from Singapore.

RENIERA MEGARRHAPHEA. (Pl. xvii., figs.5, 6; and text-fig.3).

*Introductory.*—Whether this species is properly represented by the specimen described by Whitelegge, it is not at present possible, with complete certainty, to say. The chief reason for doubt is the fact that the specimen, which unfortunately is only a small portion of the original, fails to enable one to reconcile it with Lendenfeld's description as regards external features; it is *not* digitate or lobose, but is portion of what, to all appearance, was a massive sponge unprovided with lobes



or prominences of any kind. But in its skeletal character, it exhibits considerable agreement with the description, except in one particular. Thus, in keeping with what is therein stated, its skeleton consists of bundles of spicules arranged somewhat in the manner of a network, spongin is not discernible, the spicules of the bundles are oxea of large size, and there are present smaller spicules of a different kind. But the last-mentioned spicules are stated by Lendenfeld to be oxea, and to occur interstitially in some abundance; whereas in the specimen, as Whitelegge has already made known, they are styli, and, moreover, are comparatively scarce except in the dermal region. This discrepancy in the matter of spiculation, however, cannot be regarded as serious. For, in the first place, as the smallest of the oxea are of about the same size as the styli, one can see how, through hasty or careless observation, the mistake could easily be made of supposing that all the smaller spicules were oxea; and in the second place, as regards their abundance, it is possible that in some parts of the sponge the smaller spicules are plentiful, inasmuch as Whitelegge also has described them as numerous. Consequently, the only serious obstacle to the acceptance of the specimen, as a genuine example of *Reniera megarrhapha*, is its apparent non-agreement therewith in respect of external features; but as this may possibly be due merely to its incompleteness, I accordingly propose that the specimen (which, for reasons stated below, I refer to the genus *Amorphinopsis*) be definitely adopted as the type.

*Description.*—Sponge more or less massive; its precise external form not with certainty known. Oscula scattered, variable in size (up to 2 mm. in diameter), irregular in shape, perhaps restricted in their occurrence to the more elevated parts of the surface. The surface is generally even, but may become, in places, deeply wrinkled or folded. No dermal membrane is recognisable. The arrangement of the dermal skeleton is such that the surface exhibits a minutely reticulate or a perforate pattern (Plate xvii., fig.5), the one or the other according as the

interstices, the diameter of which varies from about 150 to 400  $\mu$ , are separated by relatively narrow lines or by relatively broad. The interior of the sponge is traversed by abundant canals, of

which the largest measure 4 mm. in diameter; and, in consequence of this, its structural appearance, as shown on a cut surface, somewhat resembles that of well aerated bread. The consistency is firm and moderately tough. The colour in spirit is greyish-brown within, and yellowish-grey on the surface.

The main skeleton (Pl. xvii., fig. 6) is halichondroid, consisting of a dense, irregular, ill-defined mesh-work of spicule-bundles; fibres, in the proper sense of the term, can scarcely be said to be present, and even the bundles as a rule are not very distinct as such. Frequently the disposition of the spicule-bundles is such as to produce a somewhat lattice-like pattern; but even so, the pattern is much confused. For the most part, the bundles are multispicular, and the meshes of the network are very much less in width than the length of the spicules. The



Fig 3. — *Amorphinopsis megarrhaphea*. a, Principal spicules. a', Abnormal forms (very rare) of the preceding, with accessory actines near one extremity. b, Dermal styli.

dermal reticulation (the meshes of which, as already stated, measure in diameter from 150 to 400  $\mu$ ) is formed by coarse fibres, varying from 130 to upwards of 280  $\mu$  in stoutness, composed of oxea similar to those of the main skeleton. Supported upon these fibres are closely-crowded short styli, which stand perpendicularly to the surface with their apices directed outwards. Styli similar to these also occur scattered sparsely through the interior.

*Spicules.*—(a) The oxea, which range in length, with increasing stoutness, from very rarely less than 220 to about 950  $\mu$  and attain a maximum diameter of 31  $\mu$ , are very slightly curved, fusiform spicules, tapering from the middle of their length gradually to sharp points, and peculiar in the fact that their outer or convex side is curved somewhat angulately as compared with their concave side. The last-mentioned feature is usually best marked in the stoutest spicules. As modifications of the oxea, a few styli occur, which are evidently the result of a partial atrophy as regards length, and the rounding off of the extremity, of one actine. Further, a peculiar abnormality is occasionally shown, perhaps too rare to be considered of phylogenetic significance, in which the spicule is provided near one extremity with one to several short accessory actines, so as to resemble a Tetraxonid mesoclad.

(b). The styli are straight or slightly curved, somewhat fusiform, and gradually sharp-pointed at the apex. They measure from 160 to 250  $\mu$  in length, and are at most 9  $\mu$  in diameter.

*Loc.*—Port Jackson.

*Remarks.*—The species is, without doubt, of the same genus as *Hymeniacidon* (?) *fatida* Dendy(11), concerning whose correct generic designation, however, there is considerable difference of opinion. It has been referred by Topsent(44) to the genus *Amorphinopsis*; by Dendy at a later date(15) to *Leucophlæus*; and by Lindgren(30), Thiele(42), and again quite recently by Hentschel(21), to *Ciocalypta*. I cannot agree that such species, possessing a halichondroid main skeleton of oxeote spicules and a dermal skeleton of erect styli, are correctly assignable to *Ciocalypta*; nor can I see any better reason why they should be referred to *Leucophlæus*, the type-species of which, *L. massalis* Carter (6), besides lacking their characteristic dermal skeleton, has a main skeleton composed of styli. On the other hand, in the forms of their spicules, *Hymeniacidon* (?) *fatida* and *Reniera negarrhaphea* agree with Carter's *Amorphinopsis excavans* very closely; though, unfortunately, we do not know whether in this, the type species of *Amorphinopsis*, the stylote spicules form a dermal skeleton. There is, however, a probability that

they do; for Lindgren (*loc. cit.*) has described as *Uicocalypta fætida*, a sponge which, while exhibiting the characteristic skeletal features of *Hymeniacion* (?) *fætida*, also bears so striking a resemblance in its stelliform surface-pattern to *Amorphinopsis excavans* that he regarded it as sufficient to establish the identity of these two species. The evidence is sufficient, therefore, to render it advisable, for the present, to assign *H. fætida* and *R. megarrhaphea* to the genus *Amorphinopsis*.

The character of the main skeleton in these two presumable species of *Amorphinopsis* suggests that the genus is related to *Halichondria* and *Topsentia*; and one cannot regard it as other than significant, therefore, that whilst oxea exhibiting the peculiarity of form of those of *R. megarrhaphea* are of very rare occurrence, closely similar spicules are found in *Topsentia colossea* Lundbeck (31), = *T. pachastrelloides*, *vide* Topsent (47). In the genus *Halichondria* also, somewhat similar spicules are possessed by *H. firma* Bowerbank (2c). Accordingly, I would say that these three genera, which at present are referred to three different families, ought to be included in the same family, either the *Epipolasidæ* or the *Haploscleridæ*—and perhaps preferably in the former, since it seems now generally to be conceded that *Topsentia* and (some species at least of) *Halichondria* have originated from *Astromonaxonellida*. If such a classification were adopted, the genera *Pyloderma* (24), *Eumastia*, *Trachyopsis* (15) and *Migas* (37)\* might also be admitted in the *Epipolasidæ*; and it would then be advisable to divide this family into three subfamilies—*Coppatiinæ*, *Streptasterinæ*, and *Halichondriinæ*.

#### RENIERA PANDÆA.

The specimen labelled as the type of this species—a description of which has already been furnished by Whitelegge (56)—agrees excellently with the original description so far as skeletal characters are concerned, but is wholly incompatible therewith in other respects; its spiculation, in consequence of which Whitelegge referred it to the genus *Rhaphisia*, is similar to

\* The name *Migas* is preoccupied for a genus of spiders.

that of *Hemitedania anonyma* Carter (*vide* Appendix), and of that species I consider it to be an example. This discrepancy between the ostensible type-specimen and the description of the species renders extremely significant the fact that the skeletal characters ascribed by Lendenfeld to *Reniera pandæa* are not only quite inappropriate to the genus to which he has assigned it, but are even inconsistent with his definition of the family to which it belongs; for the *Homorrhaphidæ* are defined by him as having only oxete or strongylote megasclera, whereas the spicules of *Reniera pandæa* are stated to be stylote.

The evidence regarding *Reniera pandæa* seems to me, therefore, to justify the conclusion that the skeletal characters attributed to it are those of a different species from that upon which the description of its external characters was based, and that the latter species, represented by the above specimen, is that to which the name *Reniera pandæa* was intended by Lendenfeld to apply; but, as to the identity of the former species, I am yet unable to express an opinion.

Under the circumstances, I consider that the name *Reniera pandæa* should be regarded as a synonym of *Hemitedania anonyma*.

#### RENIERA LOBOSA.

No specimen labelled as *Reniera lobosa* occurs either in the collection of the Australian Museum or among the fragments recently received from the British Museum; and no sponge admitting of identification with the species is known to me.

#### PETROSIA HEBES. (Text-fig.4).

*Introductory.*—As Whitelegge has already indicated, the specimen standing as the type is sufficiently in agreement with the description of the species to obviate any doubt as to its being a genuine example thereof, but the description omits certain important particulars concerning the spiculation. To this it may be added that the specimen is specifically identical with a fragment labelled *Petrosia hebes* from the British Museum. The information furnished by Whitelegge is very

meagre, and, moreover, is found to be not quite accurate. The species consequently needs redescription. Unfortunately, the specimen is only a very small piece of the original, and affords no information concerning the external form, or the character and arrangement of the oscula. In regard to these features, therefore, I have in the following description, in order to make it as far as possible self-complete, rewritten what is stated in the original description.

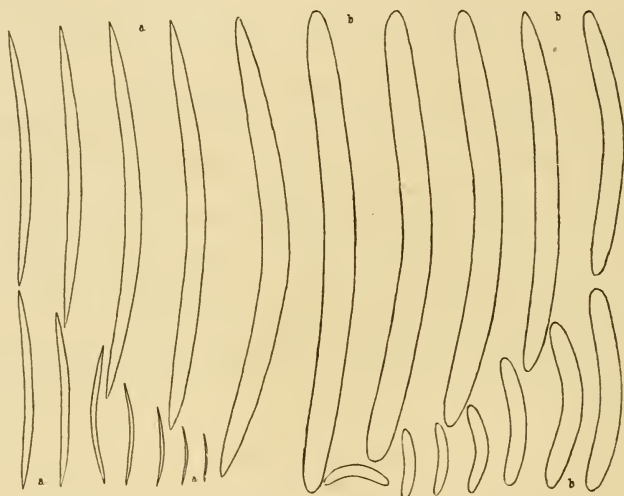


Fig. 4.—*Petrosia hebes*. a, Strongyla. b, Oxea.

*Description*.—"Irregular, massive sponges, horizontally extended, 80mm. broad and 30mm. high; with digitate processes on the upper surface, which attain a length of 40mm. and a thickness of 15mm.; they are irregularly curved, knotty, and often flattened. The surface is smooth. Oscula inconspicuous and scattered, circular, 1 to 3mm. in diameter."

The single piece, which is preserved in alcohol, shows a thin, delicate, non-separable dermal membrane. The consistency is firm and fairly hard, but brittle and somewhat pulverable. The texture is finely porous; the colour, light yellowish-grey.



The main skeleton is a coarse, irregular, reticulation of very stout fibres, often exceeding  $300\ \mu$  in thickness, composed of densely packed strongylote and substrongylote spicules uncemented by spongin. The meshes of the reticulation, which are usually more or less rounded in outline, are of very variable width, averaging, say,  $500\ \mu$ . Within the meshes are abundant scattered spicules, which sometimes form rather dense masses; these spicules for the most part are similar to those forming the fibres, but comprise also fairly numerous, slenderer, oxeote spicules of a distinct kind. At the surface, the outermost transverse fibres of the main skeleton constitute a subdermal reticulation that extends horizontally immediately beneath and in contact with the dermal membrane. The dermal membrane is provided with numerous horizontally directed oxea (similar to those scattered in the choanosome) which in general are arranged reticulately, forming meshes of about  $120\ \mu$  in diameter. Where the membrane overlies the interstices of the subdermal reticulation, it is pierced by round pores, each of which singly occupies one of the meshes of the dermal reticulation.

*Spicules.*—(b). The strongyla are more or less curved, range in length from (rarely) less than 40 to about  $280\ \mu$ , and attain a maximum diameter of  $17\ \mu$ ; the shortest have an average stoutness of about  $7\ \mu$ . Generally speaking, the longer spicules are less curved than the shorter, and are less bluntly rounded off at their extremities, so that very often they might more correctly be termed sub-strongyla, or even, at times, sub-oxea. Also, the shorter spicules are often somewhat angulately curved. Of the longer spicules, an occasional one is asymmetrical with regard to opposite ends, approximating to the form of a bluntly pointed stylus.

(a). The oxea also are more or less curved, though usually in less degree than the strongyla; and their curvature likewise is often slightly angulate. The greater degree of curvature and of angularity of curvature are, however, as in the case of the strongyla, more frequently shown by the shorter than by

the longer spicules. They range in length, with increasing stoutness, from 30 to 255  $\mu$ , and attain a maximum diameter slightly exceeding 8  $\mu$ ; the shortest vary in diameter from 2 to 4  $\mu$ . Intermediate forms between the oxea and strongyla, if they exist, are very rare.

*Loc.*—Port Jackson.

*Remarks.*—*Petrosia hebes* agrees in essential general features with *P. crassa* Carter, which, according to Lundbeck, is closely allied to *P. dura* Nardo, the type-species of the genus. The species is of interest, as it appears to afford indubitable proof of the very near relationship to *Petrosia* of the genus *Strongylophora* Dendy (15), which was placed by its author in the *Gelliinae*, although regarded by him as being of somewhat doubtful systematic position. I am even inclined to think that the two genera will have to be united, though it is possible that their combined species may be found capable of separation into two genera upon a new basis of distinction. One finds that Thiele (41), prior to the establishment of Dendy's genus, has referred to the genus *Petrosia*, without comment, a species (*P. strongylata*), which possesses exactly the same peculiarities of spiculation as *Strongylophora durissima*; and these two species differ from *Petrosia hebes* apparently only in one noteworthy feature, viz., the uniformly small size of their dermal oxea.

#### HALICHONDRIA RUBRA.

As Whitelegge (54) has indicated, the specimens labelled as the types of this species and of its variety *digitata* are similar in skeletal characters to *Rhaphisia* (*Hemitodania*, g. nov) *anonyma* Carter; indeed, the only feature which at all distinguishes them is their tubular digitate habit (resembling that of *Siphonochalina*), and as other specimens occur in the collection which are intermediate between digitate and submassive in external form, this cannot be regarded as of specific value. Whitelegge makes it appear as if the specimens were quite satisfactory examples of *Halichondria rubra*, and actually

mentions that one of them "appears to be a portion of the figured type of the variety"; the fact is, however, that although the specimens show many points of agreement with Lendenfeld's description, yet as regards external features, in one respect at least, they are absolutely incompatible with that description; for Lendenfeld states that the oscula "are scattered and of varying size, 2 to 5mm. in diameter," whereas the specimens have no oscula other than the openings at the extremities of their tubular branches. It is impossible to suppose that such a mistake could arise through inaccuracy of observation, and it is equally difficult to believe that the specimens are not in some way connected with the species they purport to represent—since (i.) they accord with the description as far as skeletal features are concerned; (ii.) they occur in the collection under several independent labels all bearing the same name; and (iii.) a fragment from the British Museum labelled "*Halichondria rubra* var. *tenella*" belongs to the same species. The only explanation seems to be that Lendenfeld's descriptions of *H. rubra* and its variety were derived each from two different species—the second paragraphs of the descriptions, relating to internal features, from specimens of *Hemitledania anonyma*; and the first paragraphs, having reference to external features, from specimens of some species (or, it may be, two species) quite distinct. What the latter species may have been, I am unable to suggest, and it is scarcely of importance to know: the name *Halichondria rubra*, including the varietal name *digitata*, must be considered to belong rather to the species exemplified by the type-specimens, and hence to be a synonym of *Hemitledania anonyma*. (*Vide* Appendix).

In connection with *H. rubra* var. *digitata*, conclusive proof is forthcoming that an additional serious mistake was made. Contrary to the statement of Whitelegge quoted above, the figure given in the Catalogue (Pl.ii., fig.1) is obviously not illustrative of *Hemitledania anonyma*, and at first I therefore thought it must portray the other species implied in the

description. This, however, is not the case, for I have since found the actual specimen from which the figure was taken, and it is a comparatively quite small sponge; it is labelled in Lendenfeld's handwriting with a name ("*Renioclathria arbuscula*") which is given in the key-list as the manuscript synonym of *Clathriodendron arbuscula*, but even this information is incorrect, for it proves to be a new species of *Raspailia*—*R. agminata* (vide Appendix).

#### HALICHONDRIA MAMMILLATA.

In the case of this species, neither the ostensible type-specimen in the Australian Museum nor the specimen labelled as representing it in the British Museum is in the least capable of being reconciled with the description of the species; and, so far, I have met with no sponge to which the name *Halichondria mammillata* is, in my opinion, applicable. The specimens in question have already been referred to by Whitelegge, from whose remarks one would gain the impression that the former is undoubtedly a genuine example of the species and that therefore Lendenfeld's description simply is inaccurate with respect to the dimensions of the spicules. In point of fact, however, this specimen is quite as much at variance with the description in external as in internal features, being a tubular digitate sponge belonging to an (apparently undescribed) species of *Siphonochalina*. The British Museum specimen, on the other hand, has a skeleton consisting almost entirely of foreign spicule-fragments (but containing in addition proper spicules in the form of scattered slender strongyla and sigmata) and belongs to an undetermined species of *Chondropsis*. It is possible that the latter, of which I have seen only a fragment, is an example of the species described by Lendenfeld in his "Monograph of the Horny Sponges" under the name of *Sigmatella* (i.e., *Chondropsis*) *corticata* var. *mammillaris*, and accordingly that it possesses external features very similar in kind to those ascribed to *Halichondria mammillata*. If this should prove to be the case, there would be reason to suspect that the description of *Halichondria mammillata* was based

partly on one, and partly on another, of two quite distinct species. For the present, in the absence of any proof to the contrary, the species should, I think, be looked upon as a correctly described and valid one, belonging—though perhaps doubtfully—to the genus to which Lendenfeld assigned it.

HALICHONDRIA CLATHRIFORMIS. (Text-fig.5).

*Introductory.*—Although Whitelegge(56) seems to have definitely accepted, as the type of this species, the Australian Museum specimen labelled as such, it is nevertheless obvious from his description of it that it cannot be an example of Lendenfeld's *Halichondria clathriformis*, for in no respect does it agree with the latter as described except in its possession of oscula of moderately large size. I find it to be of the same species as the sponge (of extremely common occurrence on our beaches after storms) which Whitelegge\*(54) previously described under the name *Chalina finitima* Schmidt, believing it to be identical with the *Acervochalina finitima* recorded from the east coast of Australia by Ridley(34); this, however, it certainly is not, since unlike the latter it contains multi-serially arranged spicules in the secondary fibres. What the correct name is I am unable to say, though I have reason to believe that the species will prove to be one of those described by Lendenfeld under the generic name *Chalinopora*. In order to prevent confusion, I would recommend that this sponge be known, for the present, as *Chalina finitima* Whitelegge (*non* Schmidt). A figure of the specimen referred to is shown on Pl.xviii.(fig.1).

On the other hand, the British Museum specimen (labelled *Halichondria clathriformis*) referred to by Whitelegge—a small piece of which I have had the opportunity of examining

\* Whitelegge's failure to perceive this identity is attributable partly to the fact that the specimen is incomplete and lacking in a shape suggestive of the species, and partly to the fact that, unlike all other specimens known to him, it is preserved in alcohol with the soft tissues intact and in this condition does not display the peculiar looseness of texture of the skeleton nor the distinctive dermal pattern which are the two most noticeable features of the sponge in the dry state of preservation.

—presents features which, if allowance be made for probable errors of omission in the original description, afford very good reason for believing it to be a genuine example of the species. For not only do its megascleres mostly conform to the descrip-

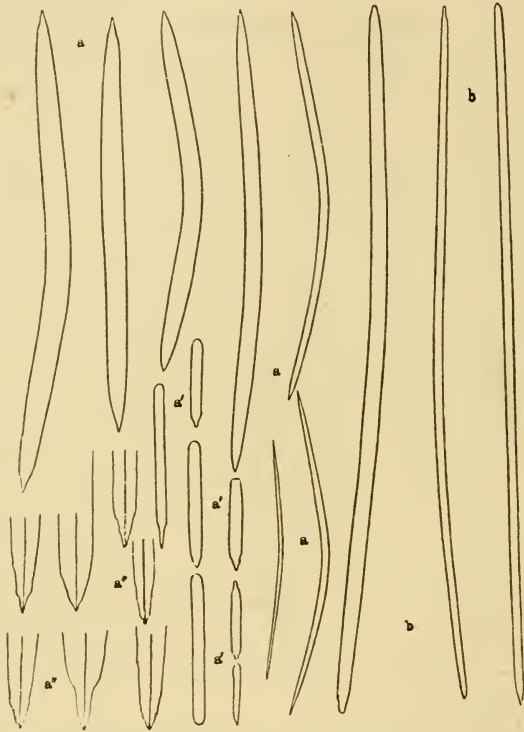


Fig. 5.—*Thrinaecophora(?) clathriformis*. *a*, Principal oxea. *a'*, Strongylole spicules (presumably abortive forms of the preceding; exceedingly scarce). *a''*, Extremities of principal oxea. *b*, Interstitial oxea and styli.

tion, “oxystrongyla slightly curved in the middle and very slightly tapering towards the ends,” but—what is especially significant—they also exhibit, at one or both extremities, “a very narrow and sharp spine.” This last-mentioned pecu-



liarity, however, is not as Lendenfeld's statement with regard thereto would imply, a feature of all the spicules, nor perhaps even of a majority of them; and also at variance with the description are the facts that the megascleres (which attain to considerably greater dimensions than stated either by Lendenfeld or Whitelegge) are of two kinds, and that microscleres are present in the form of trichodragmata. Yet to these discrepancies no importance can be attached, inasmuch as the trichodragmata, owing to their minuteness of size, and the megascleres of one kind, owing to their comparative fewness and not very marked difference in form from the others, could very easily escape detection, and, in fact, were overlooked by Whitelegge; while, as regards the matter of the size of the megascleres, it has to be borne in mind that the measurements given in the Catalogue are seldom accurate. Accordingly, I have no doubt that the British Museum specimen is correctly labelled, and propose that it be taken as the type of the species—now to be known as *Thrinacophora* (?) *clathriformis*.

*Description.*—For an account of the external features, one must depend, for the present, upon the rather meagre information afforded by the original description, which is as follows:—"Sponge lobose, massive, attaining to a height of 250 mm., erect, attached by a small base, with very large and conspicuous oscula, 10mm. wide, which lie scattered on the summits of the lobes, and a smooth surface." It is well to be reminded of the possibility, however, that this portion of Lendenfeld's description and the remaining portion of it having reference to the internal features may have been based respectively upon two different species.

The skeleton consists, in part, (i.) of a ramifying system of multispicular plumose "funes" (compound fibres), which are distinguishable into (a) stouter and more compact primary ones, 0.5 mm. to perhaps 1 mm. or more in diameter and relatively few in number, constituting the chief axes of the skeleton, and (b) slenderer secondary ones running off from these to the surface, usually with much branching and some amount

of interconnection; and, in part, (ii.) of an irregular reticulation composed of thin pale-coloured horny fibres and of somewhat disorderly disposed spicules which for the most part are not enclosed within the horny fibres, but merely held together by them. The funes, also, are composed of reticulating horny fibres and spicules, but in them the meshes of the reticulation are much smaller and the spicules are much more uniformly oriented, the latter being in general not widely inclined from the longitudinal direction of the particular fune containing them; the funes are rendered plumose by the obliquely outward inclination of their most exteriorly situated spicules, some of which give rise to occasional short wispy strands.

In the single thick section\* examined by me, these two types of skeleton-pattern—axinellid in the one case, somewhat approaching to halichondroid in the other—occur for the most part separately from each other. Thus, on the one side of a primary fune, which approximately coincides (probably merely by chance) with the mid-line of the section, the pattern is mainly of the former type; while on the opposite side of it, the pattern is mainly of the latter or more halichondroid type. The structure of the funes is such, however, that they might be interpreted simply as more condensed portions of the skeleton, in which at the same time the spicules tend towards a disposition in a common direction.

There is no dermal skeleton; and, furthermore, in a superficial layer of the sponge, varying from about 150 to 600  $\mu$  or so in width, no spicules occur except those composing the (somewhat distantly separated) extremities of the outwardly running fibres. As regards its histology, this layer (as seen in a

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\* In thin sections, as may easily be understood, the funes do not appear as such; and as a consequence, the arrangement of the skeleton seems to be rather confused. At first, having only examined such sections, I was disposed to regard as fairly satisfactory Lendenfeld's statement that "the skeleton consists of bundles of loosely disposed spicules, which are connected by very numerous others, scattered in such a way that the whole often appears like a dense mass of irregularly disposed spicules."

thin stained section) gradually assumes towards its exterior a structure somewhat resembling that of a stratified epithelium.

*Spicules.*—(a) The prevailing megasclere—that participating in the formation of the fibres—is a symmetrically curved, slightly fusiform, irregularly ended amphioxea, varying in length from about  $240\ \mu$  (in the case of the slenderest) to slightly more than  $500\ \mu$ , and in diameter from (seldom less than)  $13$  up to about  $28\ \mu$ . The curvature when most pronounced is usually somewhat angulate. Except in the case of the slenderer (?immature) individuals, which for the most part (or perhaps exclusively) occur only between the fibres, the spicule narrows to its extremities as a rule, not by a continuous gradual tapering but by a series of more or less abrupt contractions that commence not farther than  $30\ \mu$  from the extremities. The endmost contraction is frequently very pronounced, and the spicule is thereby rendered apiculate; the terminal portion of the spicule is then either sharp-pointed, resembling a mucro, or is rounded off at the point and nipple-shaped. A small proportion of the spicules are intermediate in the form of their extremities between oxea and strongyla, and rare styli also occur, the form of which clearly shows them to be the result of failure on the part of one of the actines of the oxea to attain to its normal development. In addition, there are present exceedingly scarce (apparently) abnormal, forms of cylindrical shape, either symmetrically ended (strongyla) or with one extremity abruptly narrowed, which range in length from less than  $60$  to (very rarely) upwards of  $180\ \mu$ , and in stoutness from  $8$  to  $14\ \mu$ ; they recall the somewhat similar spicules of *Gellius rhapsidophora*, and should perhaps be reckoned as constituting a form distinct from the above spicules.

(b) The second form of megasclere is comparatively rare, and occurs scattered. Like the preceding, it is diactinal and very often exhibits some degree of irregularity in the formation of its extremities; but it differs in being of greater length and relatively slenderer, in having always more or less rounded extremities, and in being as a rule without curvature. The length, seldom if ever less than  $500\ \mu$ , may attain to  $810\ \mu$ ; and the

diameter, which is usually between 3 and 11  $\mu$ , may in rare instances be as great as 18  $\mu$ .

(c). The trichodragmata are fairly abundant, but are not readily detected owing to their small size; they measure 12  $\mu$  long by 6  $\mu$  or less in diameter. The trichites composing them are usually arranged in a somewhat confused fashion.

*Loc.*—Port Jackson.

#### Genus RENIOCHALINA.

No species identifiable with either of the two (*R. stalagmites* and *R. lamella*) for which this genus was established, is known to me. The two specimens purporting to be their types, a brief description of which has been given by Whitelegge (who seems to have been satisfied to regard them as the genuine types), are quite irreconcilable with Lendenfeld's account of the species, either in external features or in skeleton: as they appear to me to be specifically identical (though possibly of different varieties) and not to be assignable to any hitherto established genus I have described them (in the Appendix to this paper) under the name *Axiamon folium*.

The specimens in question, it should perhaps be mentioned, are not labelled actually as *Reniochalina stalagmites* and *Reniochalina lamella*, but as "*Chalinodendron stalagmites*" and "*Renieroplax ianthella*"—the latter names being those given in the key-list as the manuscript synonyms of the former. However, among the fragments received from the British Museum there is one labelled "*Reniochalina stalagmites*," which is identically similar to "*Chalinodendron stalagmites*," as well as two others (of different species) labelled respectively "*Reniochalina arborea*" and "*Reniochalina spiculosa*," which also are examples of the genus *Axiamon*. In the face of these facts, I can only surmise that Lendenfeld originally intended to employ the name *Reniochalina* for a genus different from that for which finally he adopted it—and for which presumably he considered it more appropriate.

The genus *Reniochalina* was defined by Lendenfeld as follows:—"Lamellar, thin, branched, more or less flower-shaped

Renierinæ, with smooth surface and fibrous skeleton; the spicules are partly embedded in spongin." From the descriptions of the two species, we learn, further, that the skeleton consists of "three systems of fibres—one longitudinal extending from the base to the margin of the lamella, the second transverse, and the third perpendicular to the plane in which the other two extend"; that these fibres, thus forming a rectangular meshwork, consist of bundles of somewhat irregular spicules; and that the spicules are pointed diactinals of moderate size accompanied or not by relatively few styli. In the typical species, *R. stalagmites*, the spicules are oxea exclusively. It would appear, therefore, that *Reniochalina* is very similar to the genus *Axinosa* established by me in the present paper for *Axinella symbiotica* Whitelegge and like species, excepting that, in the latter, the spicules are predominantly styli. Several species (as yet undescribed) differing from *Axinosa* apparently only in the fact that their spicules are exclusively or almost exclusively oxeote are known to me; and for the accommodation of such species, I think, the genus *Reniochalina* might provisionally be made to serve. I am doubtful, however, whether these species will ultimately be found separable from the genus *Reniera*, unless on the additional ground of their lamellar external form.

It will be noticed in the case of *Reniochalina lamella* that the description which Lendenfeld gives of its external characters, wherein the surface of the sponge is stated to bear conuli, is contradictory to his definition of the genus. There is reason to suspect, therefore, that the external features ascribed to this species are those of a different sponge from that upon which the description of its skeletal characters was based and to which the name *Reniochalina lamella* was intended to apply.

#### Familia HETERORRHAPHIDÆ.

##### Subfamily STYLOTELLINÆ.

Under this subfamily, erected expressly for their reception, there are described in the Catalogue four species, for which



Lendenfeld introduces the new genus *Stylotella*. The *Stylo-**tellinae* are defined as *Heterorrhaphidae* without differentiated microsclera, and without a hard spicular rind; and *Stylotella* is stated to have as its distinguishing characters: (i.) a very soft texture, and (ii.) megasclera in the form of styli, scattered and in bundles. Of the four species I am able to identify, with certainty, only two, *S. digitata* and *S. polymastia*. The latter of these proves to belong to the genus *Ciocalyptra* (or perhaps to *Leucophlæus*); while the former, which was the first to be described and which I propose to regard as the type-species, is found to be identical with the earlier described *Hymeniacidon agminata* Ridley(33). This species, however, as will be seen from the description given below, differs considerably from typical species of *Hymeniacidon*, and undoubtedly requires to be placed elsewhere; for its reception the genus *Stylotella* may therefore be retained, with the following definition:—"Typically non-massive Suberitidæ(?), of comparatively soft consistency, with a well-defined dermal membrane which is provided with tangentially placed spicules and is underlain by subdermal spaces, and with a main skeleton composed of longitudinal spicule-fibres (devoid of spongin) and of scattered spicules. The spicules are typically of a single kind, styli or subtylostyli; microscleres are absent."

The genus, which is of doubtful systematic position, I refer to the *Suberitidæ* chiefly on account of the character of the skeleton, and the seemingly greater difficulty of justifying its inclusion in any other family. The serious objection to this is, of course, the absence of tylostylote spicules; but as regards the other features in which it departs from typical *Suberitidæ* it may be pointed out that the possession of a dermal membrane is characteristic of *Pseudosuberites* and *Caulospongia* (= *Plectodendron*), and that most species of *Semisuberites* and *Laxosuberites* are of soft consistency.

Lendenfeld's *Stylotella aplysilloides* appears, from its description, to belong to *Hymeniacidon*; and his fourth species, *S. rigida*, I regard (provisionally) as a synonym of *S. agminata*.



Of the several species which other authors have assigned to the genus, there is only one, I think, that can be permitted to remain therein, *viz.*, *S. digitata* var. *gracilis* Hentschel (21); and as this has the styli partially differentiated into two kinds, it may be looked upon as an independent species. Hentschel's *S. flabelliformis*, described in the same paper as the preceding, appears not to be referable to any hitherto established genus, and accordingly I propose to constitute it the type of a new genus, *Stylissa*, to be placed in the *Axinellidae*. The species which Topsent (43) has referred to *Stylorella*, under the impression that his genus *Stylinos* was identical therewith, ought perhaps to be included in *Hymeniacidon*, as Dendy has maintained. It is very doubtful, however, whether *Stylinos jullieni*, the type species of Topsent's genus, can thus be disposed of. The so-called *Stylorella irregularis* Kirkpatrick (23), appears to be related to, and is perhaps truly congeneric with, the two species described by Whitelegge (57) under the names *Phakellia multiformis* and *Axinella symbiotica*; at any rate, these three species,—and also, I should say, *Axinella arborescens* R. & D.—might very well be referred tentatively to a single genus, and I, therefore, venture to create for them the genus *Axinisia* (with *Axinella symbiotica* as the type-species) which I would define thus: *Axinellidae*, typically of ramose or lamellar habit, with a reticulate, subrenieroid, skeleton formed by plurispicular main fibres joined at more or less regular intervals by uni- or paucispicular transverse fibres. Spongin is comparatively scantily developed. The spicules are moderately small conical styli, together with typically fewer strongyla and (or) oxea, all of approximately the same dimensions. Microscleres are absent.

STYLOTELLA DIGITATA. (Pl. xix., figs. 1-5; Pl. xx., fig. 2; and text-fig. 6).

*Introductory*.—This species, now to be known as *Stylorella agminata* Ridley, is represented in the collection of the Australian Museum by sixteen specimens, all from Port Jackson;

in addition to the single type-specimen, which is labelled "*Truncatella digitata*" and conforms closely to Lendenfeld's description, these also include the specimens labelled as the types of *Stylotella rigida*, *Tedania laxa*, and *T. tenuispina*—

which three species, for reasons more clearly indicated in due course, I propose to regard as synonyms of *S. agminata*. Two further examples of the species occur also among the fragments of sponges received from the British Museum, one labelled "*Truncatella micropora*" (a MS. name), the other mistakenly labelled as "*Clathriodendron irregularis*." Among these fragments there is also one labelled "*Stylotella digitata*, Port Nelson, N.Z.," but this proves to belong to quite a different species; as a consequence there is reason to doubt Lendenfeld's correctness in recording the species from any locality other than Port Jackson.



Fig. 6.

*Stylotella agminata*.  
a, Styli (or subtylostyli). a', Basal extremities of subtylostyli.

*Description*.—The external features of the species have already been sufficiently described by Ridley and by Lendenfeld: in regard thereto, the latter author's descriptions of *Stylotella digitata* and *Tedania laxa* are applicable, but not strictly his descriptions of *S. rigida* and *T. tenuispina*. The oscula, concerning which these several descriptions are not quite in agreement, appear always to be few in number, scattered, and small; and usually to be more or less closed over by extensions of the dermal membrane. Ridley(33) has given a figure which conveys a very good idea of the form commonly assumed by erect specimens with cylindrical branches, and to this, I now add several others—one of which (Pl. xix., fig. 3) shows an erect form, with crowded compressed parts due to imperfectly differentiated branches; while another (Pl. xix., fig. 4)

illustrates a more reticulately branched example of the species. The latter specimen, which consists of somewhat flattened, anastomosing branches forming a reticulate mass, approximates to Lendenfeld's description of *Tedania laxa*, though not so closely as do two other specimens which occur among the type-specimens of that species; and which, on account of their somewhat irregularly arranged skeleton, I at first thought to be specifically different from the rest. I mention this because, whereas Lendenfeld states that *Stylotella digitata* is intensely orange-coloured, and *Tedania tenuispina* bright orange-yellow in the living state, he states, of *Tedania laxa*, that "the colour of the living sponge is bright brick-red"; and it is possible, therefore, that two varieties of *S. agminata* occur, which differ in colour, and perhaps, to a slight extent also, in other respects.

The main skeleton (Pl.xx., fig.2) exhibits great variability in its precise mode of arrangement, but always consists (i.) of longitudinally-running spicule-fibres, which are unconnected by cross-fibres, and from the most peripherally situated of which, short branches arise that pass outwards to the surface; and (ii.) of spicules which, though they are sometimes abundant, for the most part lie scattered singly. Diversity in the conformation of the skeleton results through variation in number of the scattered spicules, and through differences in stoutness of the main fibres, and in their distance apart. For descriptive purposes, four chief types of arrangement are distinguishable; but apparently all gradations between these occur, and different types may be found in different parts of one and the same specimen. (i.). The fibres are closely arranged, running parallel to one another at a distance apart, which may be even less than their own diameter; and scattered spicules are scarce or absent: this condition, which is uncommon, appears most usually to be met with in slender cylindrical branches. (ii.). The fibres are more widely separated, and scattered spicules occur in greater or less abundance, usually crossing one another in all directions so as to produce,

when most abundant, the appearance of an irregular reticulation extending between the fibres; in this case, as in the preceding, the fibres are usually comparatively stout, being often as much as  $130\mu$  or more in diameter. (iii.). The arrangement of the scattered spicules is as in (ii.), but the fibres are slender, 20 to  $70\mu$  in diameter, and run sinuously, with frequent inter-osculation. (iv.) The fibres are rather slender and somewhat distantly separated from one another, while the scattered spicules are only moderately abundant, and are sometimes, in considerable proportion, disposed more or less longitudinally.

The first-mentioned type of arrangement is shown to best advantage by the British Museum fragment above referred to, labelled "*Clathriodendron irregularis*"; the second, by certain of the type-specimens of *Tedania laxa*; the third, also by specimens of *T. laxa*; and the fourth, by the type-specimen of *Stylotella digitata*. The third type of arrangement, or something intermediate between it and the first, is the commonest and most typical.

The dermal membrane overlies wide subdermal spaces, and is supported upon the extremities of short fibres—branches from the outermost of the longitudinal fibres—which are directed towards it more or less perpendicularly. The dermal skeleton consists of horizontally disposed spicules which, in general, are either loosely scattered without order, or are arranged somewhat in an irregular paucispicular network; around the oscula, however, they become more numerous and are disposed radiately. Occasionally, fibres from the main skeleton enter and run in the dermal membrane for a short distance before terminating.

The spicules are of a single kind, subtylostyli, usually with only a very slightly developed oblongish head, which is marked off by a scarcely perceptible constriction; occasionally the head is rendered more pronounced by a subterminal annular enlargement. They are cylindrical throughout the greater part of their length, taper gradually to a sharp point, and vary from straight to curved (or sometimes flexuous); usually the

curvature is slight, and the proportion of straight to curved spicules about equal; but, at times, most of the spicules are curved, and some of them much curved. Their maximum size varies in different specimens, from 286 by  $6\ \mu$  to 305 by  $9\ \mu$ ; while the shortest spicules in any given specimen are of between one-half and two-thirds the length of the longest.

*Loc.*—Port Jackson.

STYLOTELLA POLYMASTIA. (Text-fig.7).

*Introductory.*—The species is represented in the collection of the Australian Museum apparently only by a tiny fragment, labelled "*Truncatella polymastia*," received from the British Museum. Judged by its spiculation, the fragment is undoubtedly a genuine example of the species, but unfortunately it is so small, that scarcely any information is obtainable from it concerning other characters. Nevertheless, it enables one to say that the species is certainly not assignable to the genus *Stylorella* as defined above, but, in all probability, belongs to *Ciocalyptra*—under which genus I propose to bring it.

In connection with the figure which appears in the Catalogue (Pl.iv., fig.i.) in representation of this species, a serious error has been made. As I already have had occasion to mention, the actual specimen, from which this figure was taken, is still in existence (labelled in Lendenfeld's handwriting *Sideroderma navicelligerum* R.&D.), and belongs to a hitherto unknown species of *Histoderma*, described, in the Appendix hereto, as *H. actinioides*. One can see, on comparing the figure in question with Lendenfeld's description of *Stylorella polymastia*, that the two are not compatible, although showing in some respects an apparent agreement.

In order to make the following description of the species as complete as possible, I have repeated Lendenfeld's description of its external features; but it should be borne in mind that, possibly, this description is not applicable. In consequence of the small size of the fragment, I have not succeeded in securing sections cut in the proper direction to enable me to deter-



mine the exact arrangement of the skeleton, and my description of this is consequently to be regarded as only approximately correct.

*Description.*—“Massive sponges with numerous, irregular, mostly fistular processes arising from the upper surface. The sponge is attached by a broad base and attains a maximum diameter of 300mm. The oscula are situated terminally on the summits of the processes.”

The main skeleton consists of dendritically branching, and occasionally interuniting, stout, plumose “funes”; and of numerous scattered spicules, the latter here and there forming dense masses connecting the “funes.” The “funes” are either single fibres, or are composed each of several intimately associated fibres; these fibres consist of a spongin-axis, usually enclosing some longitudinally disposed spicules, and of numerous spicules which project from this axis at varying angles, some of them directed almost perpendicularly outwards in an echinating fashion. At the surface, the columns pass into broad, dense brushes of almost parallel spicules, the outer ends of which, apparently, give support to a dermal membrane; intermingled with the spicules of the brushes, are, sometimes, numerous irregularly disposed spicules. Whether there is a special dermal skeleton, is not quite certain; but, here and there, lying upon the outer ends of the brushes, horizontally directed spicules, forming a thin layer, were observed.

*Spicules.*—(a). The spicules which chiefly compose the fibres are straight or very slightly curved, gradually sharp-pointed, fusiform styli with a narrow handle-like basal end, of diameter sometimes less than half that of the thickest portion of the shaft, measuring from about 400 to 720  $\mu$  in length, by rarely more than 25  $\mu$  in maximum diameter. The longest spicules (those, say, of length exceeding 600  $\mu$ ) are seldom, if ever, more than 20  $\mu$  in diameter; are always less distinctly narrowed at their basal end than the shorter, and relatively stouter spicules; and are connected by spicules of every intermediate grade with



(b). Straight or slightly curved, gradually sharp-pointed, usually slightly fusiform styli, abundant in the superficial skeleton and scattered throughout the interior. These, which range in size from less than 300 by  $5\mu$  to upwards of 650 by  $15\mu$ , are probably not at all separable from

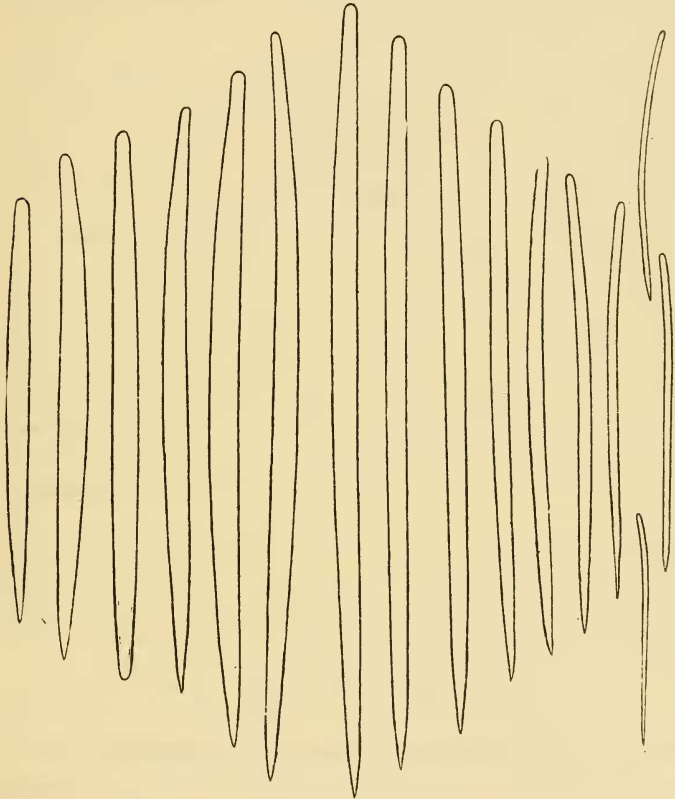


Fig. 7.—*Ciocalypa polymastia*. Styli, showing transitions from one form to another.

(c). More or less curved styli, comparatively few in number, apparently occurring only as scattered spicules, ranging in length from 160 to upwards of  $300\mu$  and measuring, at most,  $8\mu$  in diameter.

Rare oxea, of the size of the smallest styli, were observed, which possibly are of foreign origin, since no intermediates between them and the styli were observed. The larger spicules, however, are certainly never oxea, nor do they ever approach to an oxeote form; though occasionally, through rounding off at their apical end, they may pass into strongyla.

*Loc.*—East coast of Australia.

*Remarks.*—In the form of its spicules, *Ciocalypta polymastia* somewhat resembles the type-species of *Leucophlæus*—i.e., *massalis* Carter(6); and it appears to agree with the latter also in certain features of the skeleton. I am inclined to think, therefore, that the two species are congeneric. What the precise arrangement of the skeleton is, in the latter species, however, Carter's description does not make quite clear; and subsequent writers, acquainted with the species, have omitted to state explicitly. Ridley and Dendy(34a) expressed the opinion that *Leucophlæus* cannot be distinguished from *Hymeniacion*; but, at a later date, Dendy(14) states that *Leucophlæus massalis* is identical with *Ciocalypta penicillus* (the type-species of *Ciocalypta*), and mentions that, since the resemblance between these two species was pointed out by Carter himself, he is unable to understand why the genus *Leucophlæus* should have been proposed. In view of this, I am at a loss to understand why, subsequently, Dendy(15) recognised *Leucophlæus* as a distinct genus, related to *Hymeniacion*. If it be correct that *L. massalis* approaches rather to *Hymeniacion* than to *Ciocalypta* in the character of its skeleton, then, beyond question, the species described above is not assignable to *Leucophlæus*, since its fibres are decidedly of the axinellid type.

Topsent(44) in a paper which I have not seen, has apparently wrongly recorded, as *Stylotella polymastia*, a sponge from Amboina; for Kirkpatrick(23), speaking with reference to *Hymeniacion conulosum* Topsent, mentions that "the nearly related species *Stylotella polymastia* Lendenfeld, referred to by Topsent (*l.c.*, p.466), is synonymous with *Hymeniacion fenestratum*(Ridley)."

## STYLOTELLA RIGIDA.

The specimen labelled as the type of this species (under the MS. name "*Truncatella rigida*"), as well as a fragment labelled *Styлотella rigida* from the British Museum, are specifically the same; and, in skeletal characters, accord with Lendenfeld's description; but in one conspicuous feature attributed to *Styлотella rigida*—viz., the possession of oscula 1 to 3mm. in width, and situated at the extremities of the digitate processes—they are completely lacking. As a matter of fact, they are examples of *Styлотella agminata* Ridley. One is justified in concluding, therefore, that the description of *Styлотella rigida* confounds the external features of one species with the internal features of another, the latter being that represented by the type-specimen; and as the former is unknown and indeterminate, we may, accordingly, look upon *S. rigida* as, in effect, a synonym of *S. agminata*. An independent reason for suspecting that some such mistake as this was made in connection with *S. rigida*, is afforded by its specific name, the implication of which is in direct contradiction to Lendenfeld's definition of the genus *Styлотella* as "Heterorrhaphidæ of very soft texture."

Dendy(14) has mistakenly referred to this species, under the name *Hymeniacidon rigida*, a sponge from Port Phillip. As the description given of the latter is sufficient for its identification, I propose that it be called *Hymeniacidon victoriana*.

## STYLOTELLA APLYSILLIOIDES.

The specimen preserved in the Australian Museum as the supposed type of this species—for the reason that it is labelled, in Lendenfeld's handwriting, with the name ("*Truncatellina cinerea*") given in the key-list as the manuscript synonym of *Styлотella aplysillioides*—is a small, very thinly incrusting sponge, apparently belonging to the genus *Mycale*, with a thin dermal layer of foreign particles, and a main skeleton consisting (i.) of unconnected ascending fibres composed of foreign

(mostly spicule-) fragments, (ii.) of sparsely scattered subtylostyli measuring rarely as much as 130 by  $3.5\mu$  and (iii.) of a very few, scattered, slender toxa and anisochelæ, the latter measuring, at most,  $17\mu$  long. It is quite a different type of sponge, therefore, from that denoted by Lendenfeld's description, having no feature of resemblance thereto except an incrusting habit of growth, and even in this respect being not quite similar, since the layer it forms is only about 1mm. in thickness. Accordingly, in my opinion, it cannot possibly be accepted as the type-specimen.

A fragment from the British Museum, labelled *Stylotella aplysillioides*, is also totally unlike the described sponge of that name, and belongs to the genus *Dendoricella*—its spicules being skeletal oxea, dermal tylota, isochelæ arcuatæ, and two sizes of sigmata.

Hence we are left with no clue as to the identity of *Stylotella aplysillioides* except its rather brief description, which, if it can be relied upon, indicates that the correct position of the species is in the genus *Hymeniacidon*. To this genus, then, the species may, for the present, be regarded as belonging. The only other species of *Hymeniacidon* known from Port Jackson, is that recorded by Ridley(33) under the name *H. caruncula* Bowerbank; this is also a horizontally extended sponge with surface-elevations, but its spicules are stated to attain a size of 290 by  $8\mu$ , while those of *H. aplysillioides*, according to Lendenfeld, measure only 130 by  $6\mu$ .

#### Subfamilia PHLÆODICTYINÆ.

RHIZOCHALINA RAMSAYI. (Pl. xx., figs.2-5; Pl. xxi., fig.4; and text-fig.8).

The types consist of three half-specimens (derived by vertical bisection of the originals), and a thick, median, vertical slice of a fourth specimen. The sponge is massive, more or less globose, provided on its upper aspect with numerous thin-walled erect fistulæ, and below with few (sometimes only one) or

many, usually branched, stout, root-like processes. The fistulæ are, almost without exception, widely open at their distal end, though this appears to be due to their having had the extremity broken off. The roots are tapered, and convey the impression that they serve the function of anchoring the sponge in mud; according to the original description, they may attain to a length of 300mm. The largest specimen (Pl. xx., fig.2) is of comparatively irregular form, being elongated in one horizontal direction, and compressed at right angles thereto; it measures 230mm. in length, by 180mm. in height; and (though only a half-specimen) is provided with about a dozen roots.

The original description states that, in addition to fistulæ, there occur on the upper surface of the sponge, at its centre, two to five much wider and shorter tubes, 20mm. wide and only 25mm. high, the cavities of which are occupied by a reticular structure: unfortunately, in the type-specimens, owing no doubt to their not being symmetrical halves of the originals, none of these tubes are present. It happens, however, that the trawling steamer "Endeavour" has recently obtained, from off the coast of New South Wales several specimens of a sponge closely related to *Phlaodictyon ramsayi*—I propose to designate it a variety, *pyriformis*, of this species—which provides the clue to the nature of these tubes.

The variety is a stoutish, pear-shaped sponge without roots, which evidently, in life, was attached by its narrower end to a hard substratum. The fistulæ, which are short and stout, are usually not numerous, and may be altogether absent; as, in the only specimens so far obtained, they are all more or less damaged, it is not known whether their extremities are open or closed. A characteristic feature of the sponge is the arrangement of its oscula (Pl.xx., fig.3), which open side by side to the number of between 50 and 100, together forming a slightly depressed, oval or circular, honeycombed area occupying the centre of the upper surface. This oscular sieve differs from that of the typical form of the species, as describ-

ed by Lendenfeld, in the fact that its margin is not prolonged upward into a tube, but is level with the surrounding surface. The oscular canals are arranged in a manner conforming with the general symmetry (Pl.xx., fig.4): a few run upwards axially from the stalk, separated from one another only by thin partitions, while the remainder—which start from different points quite close beneath the surface—traverse the sponge radiately, in such manner as to come into parallelism with the



Fig.8.

*Phleodictyon ramsayi*.  
Oxea.

axial direction before the oscula are reached. Other canals also occur, each of which is continuous with the lumen of a fistula.

As far as can be judged from the incomplete specimens of the typical form of the species, the arrangement of its canals is much the same as in the variety. (The probability is that the canals, which connect with the fistulae, are inhalant in function).

The structure of the skeleton also is very similar in both forms, except that, in the root-like processes of the type, the main skeleton consists almost entirely of stout longitudinal fibres (50 to 200  $\mu$  in diameter) closely arranged like the strands of a rope; while, in the peduncle of the variety, the corresponding fibres are much more widely separated, and the intervening spaces are occupied by a renieroid, for the most part unispicular, reticulation, similar to that which is general throughout the body of the sponge. The fibres of the roots or peduncle, as the case may be, continue into the body of the sponge and spread dendritically through it, at a considerable average distance apart; here and there, they are connected by cross-fibres. Between the fibres, as already indicated, the skeleton consists of a renieroid reticulation. The fibres are composed of very closely packed, parallel spicules, which, apparently, are held together by a minute quantity of spongin.



The bast-layer consists of an irregular, unilamellar reticulation (Pl.xx., figs.4,5) of stout fibres immediately underlying the dermal membrane, and of numerous, inwardly directed, short, lamellar extensions of the same. The dermal skeleton proper is a single layer of horizontally disposed spicules crossing each other in all directions, and thus producing a somewhat lattice-like pattern.

The spicules are the same in all parts of the sponge—oxea, slightly and somewhat angularly curved, nearly cylindrical throughout the greater part of their length, and gradually tapering to sharp points. In the typical form of the species, their maximum size is 195 by  $8\mu$ , and their length ranges from 130 to  $195\mu$  (but is very rarely less than  $150\mu$ ); in the variety, the spicules are a little larger, attaining to a size of 220 by  $9.5\mu$ .

The typical form of the species comes from Port Jackson.

#### RHIZOCHALINA PETROSIA. (Text-fig.9).

The evidence indicates, beyond reasonable doubt, that, under this name, Lendenfeld has combined portions of the descriptions of two quite different species. In the Australian Museum, labelled, in that author's handwriting, with the MS. name corresponding (according to his key-list) to *Rhizochalina petrosia*, is a small, gauzy-textured, branch-shaped sponge, apparently belonging to the genus *Ciocalypta*, the spicules of which are oxea of exactly the dimensions stated in the description, viz., 700 by  $15\mu$ ; and from the British Museum comes a small fragment labelled *Rhizochalina petrosia*, which both belongs to the genus *Rhizochalina* (i.e., *Phloeodictyon*) and exhibits skeletal characters such as render the specific name *petrosia* extremely appropriate, but in which the oxea are, at most, only 165 by  $8.5\mu$  in size. Thus the former specimen possesses the skeletal features ascribed to the species, but is entirely different to it in external form; while the British Museum specimen (the external form of which I do not know), in spite of the above-mentioned serious disagreement with the

description, affords practically indisputable reason for believing it to exemplify the species to which the name *R. petrosia* was intended to apply. The question, as to which of these specimens is to be considered the type of the species, appears to me one that might be decided quite well by the toss of a coin; but as the latter best accords with the name, I propose that it be taken as the type—the species thus requiring to be called *Phlœodictyon petrosia*.

An adequate description of *Ph. petrosia* cannot, at present, be given, as the small fragment at my disposal consists of scarcely more than a portion of the rind. As far as can be judged from this, however, the species is distinct from any



Fig. 9.  
*Phlœodictyon petrosia*.  
Oxea.

other that has been described. The rind is usually well-developed, attaining to a thickness of nearly  $2\mu$ ; its skeleton consists of an approximately rectangular, coarse reticulation of stout fibres, measuring up to  $150\mu$  in diameter, composed of closely and not very regularly packed oxea uncemented by spongin. The skeleton bears a marked resemblance to that which is characteristic of many species of *Petrosia*. A dermal skeleton proper, external to the rind, appears to be absent. What little of the main skeleton is shown, consists mainly of scattered spicules exhibiting a tendency towards an arrangement in an irregular subrenieroid manner; but there also occur, at intervals, very stout fibres, similar to those of the rind, which apparently belong to inwardly-directed extensions of the latter, such as have been noticed in *Ph. ramsayi*. The spicules, which are the same in the rind as in the main skeleton, are somewhat angulately curved and abruptly sharp-pointed oxea, ranging in length from  $130$  to  $165\mu$ , and measuring seldom less than  $6$  and not more than  $8.5\mu$  in stoutness.

*Loc.*—Port Jackson.

## Subfamilia G E L L I N Æ.

## GELLIUS PANIS.

The species is without a type-specimen, and, so far, I have met with no sponge identifiable with it. There appears to be no reason to doubt that the species belongs to the genus to which Lendenfeld has referred it.

*Loc.*—Port Jackson.

## GELLIUS RAPIDIOPHORA. (Text-fig.10).

*Introductory.*—The type-specimen conforms recognisably to the description, but the latter is at fault regarding the size of the sigmata and the maximum stoutness (which is 9.5, not 6 $\mu$ ) attained by the oxea, and also omits to mention that the oxea are of three kinds, two of which—hence rather to be termed raphides—occur in dragmata: that raphides, however, were present in the original specimen, is both indicated by the description and implied by the specific name.

I have lately collected three specimens (from the underside of rocks exposed at low tide, near Port Jackson), which apparently in no way differ from the type of the species, excepting that their spicules are much slenderer, the stoutest oxea having (as it happens) only about the same diameter as that stated by Lendenfeld. As these specimens differ also among themselves (to the extent of 1.5 $\mu$ ) in the diameter of their stoutest spicules, it is practically certain that they are not varietally distinct from the typical form, and, therefore, I have taken them into account in drawing up the following description.

*Description.*—Sponge massive, depressed, basally encrusting. Surface even or slightly undulated, smooth, very minutely reticulate (owing to the dermal skeleton). Oscula few, scattered, marginally flush with the general surface, measuring up to 3 mm. in diameter. Colour in life, bright yellow; in alcohol, light yellowish-grey. Consistency fairly soft and friable. The interior is traversed in various directions by many canals measuring up to 2 or 3 mm. wide; otherwise the structure is fairly compact.

Of the four specimens at hand, the largest measures 100 mm. long, by 70 mm. broad, and from 2 to 15 mm. in thickness; according to the original description, the sponge may grow to a thickness of 50 mm.

The main skeleton is an irregularly renieroid, paucispicular reticulation, the pattern of which usually appears much confused owing to the great number of scattered bundles of raphides; spongin is present in minute quantity, though apparently only at the angles of the meshes. In the most superficial region, loose polyspicular strands of spicules occur, which run perpendicularly to the surface and terminate in slightly projecting tufts coinciding in position with the nodes of the dermal reticulation. The dermal reticulation, for the most part, is triangular in pattern, and has the sides of its meshes formed of from two to five roughly parallel spicules.

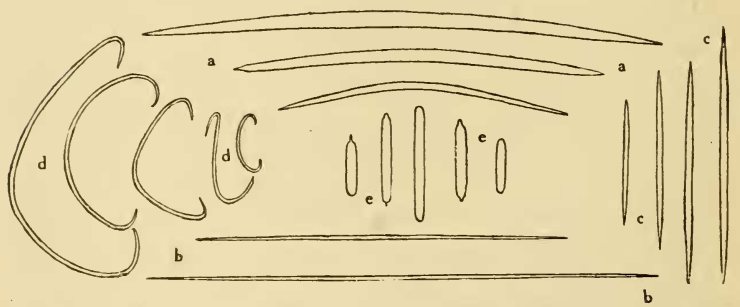


Fig. 10.—*Gellius raphidiophora*. *a*, Oxea. *b*, Sigmata. *c*, Longer raphides. *d*, Shorter raphides. *e*, Microstrongyles.

Spicules.—(*a*) Slightly curved oxea, very nearly cylindrical throughout the greater part of their length, and tapering gradually to sharp points. Size\*: (*i*) 150 to 215 by  $9.5\mu$ ; (*ii*) 120 to 195 by  $5\mu$ .

\* The two sets of measurements—which refer to the range in length of the spicules, and to their maximum stoutness—are taken from the specimens whose spicules are the most different in point of size; the former measurements are those of the type-specimen.

(b) Longer raphides, occurring only in dragmata, straight, cylindrical, gradually sharp-pointed, and slightly dilated at intervals. Size: (i) 130 to 255 by  $2.5 \mu$ ; (ii) 120 to 245 by  $1.5 \mu$ .

(c) Shorter raphides, occurring only in dragmata; straight, fusiform. Size: (i) 45 to 120 by  $4.5 \mu$ ; (ii) 40 to 95 by  $2.5 \mu$ .

(d) Sigmata, very variable in size, but apparently not separable into two groups; the larger, as well as many of the smaller, are intermediate in shape between ordinary and flagellate sigmata. Length: (i) 15 to  $76 \mu$ ; (ii) 15 to  $70 \mu$ . Stoutness: (i)  $3.7 \mu$ ; (ii)  $1.5 \mu$ .

(e) Microstrongyles, often somewhat pointed at one or both extremities; rare, but occurring in all specimens. Size: 16 to 50 by (i) 3 to (ii)  $4 \mu$ .

Loc.—Port Jackson.

Remarks.—On the evidence of a single specimen from Port Phillip, which I identify as *Gellius phillipensis* Dendy(12), this latter species is not more than a variety of *G. raphidiophora*, from which it differs chiefly in the fact that its longer raphides are immeasurably fine. In the specimen referred to, microstrongyles also occur, but are exceedingly rare, only a single example having been found in two slide-preparations.

*G. raphidiophora* is distinguished from all other species of the genus, not only in having two sorts of raphides, but also in the possession of microstrongyles; its sigmata, too, are of unusual form, and recall those of certain species of *Biemna*—e.g., *B. chilensis* Thiele(42), and *B. hamifera* Lundbeck(31). This fact concerning the sigmata seems not unworthy of notice, since also in *Biemna* the microscleres may include raphides and—if not microstrongyles exactly—siliceous globules. Actual microstrongyles, in association with raphides and sigmata, are elsewhere known to occur only in the somewhat aberrant *Tylodesma microstrongyla* Hentschel(21), and *Allantophora plicata* Whitelegge(57), two species which, I think, are allied to one another, though scarcely to be regarded as congeneric; but whether these microstrongyles (showing as they do some trace of centrotlyosis) are homologous with those of *G. raphidiophora*, it is at present impossible to say.

TEDANIA RUBICUNDA. (Pl. xvii., fig. 4; and text-fig. 11).

*Introductory.*—The type-specimen—labelled "*Pellina rubicunda*"—although somewhat at variance with the description as regards spiculation, is so closely in agreement therewith, in most other respects, that any doubt as to its genuineness is quite precluded. The spicules are not, as Lendenfeld has stated, mainly *tylota*, but mainly styli—the former being abundant only in the dermal layer; furthermore, oxea are entirely absent, the tylota have conspicuously spined extremities, and the triebites are minutely spinulose. Thus, the spiculation—and, I might add, the general arrangement of the skeleton also—conform to those of *T. digitata*, of which species, therefore, *T. rubicunda* may, for the present, be considered a variety.

*Description.*—The single specimen (Pl. xvii., fig. 4) is a sessile, massive sponge, with a somewhat cylindrical, stoutish body, about 80 mm. in diameter and 100 mm. in height; which divides above into two larger, and is provided also, towards its upper aspect, with several smaller, digitiform, tapering lobes or processes. There is a well-defined dermal membrane, and the surface generally, except where bruised and damaged, is smooth and glabrous; the processes, however, show a few, usually quite shallow, longitudinal furrows or wrinkles. According to the original description, the processes are traversed by a central oscular tube, and have, at their summit, a number of small oscula. The first part, at least, of this statement is not strictly correct; except in their lower portion, the processes are traversed by distantly separated canals, and these are of small size, usually less than 1 mm. in diameter. These canals run longitudinally, gradually converging as the process becomes narrower, and (perhaps not in all cases) finally unite, at a variable distance from the extremity of the process, to form a single fairly wide canal. This terminal canal, no doubt, communicates with the exterior at the apex of the process, though the manner of accomplishment of this is not apparent in the present specimen; if it is by means of oscula, as is probably the case, these must be very small. The chief excurrent canals, both in the processes and in the body of the sponge, are surrounded

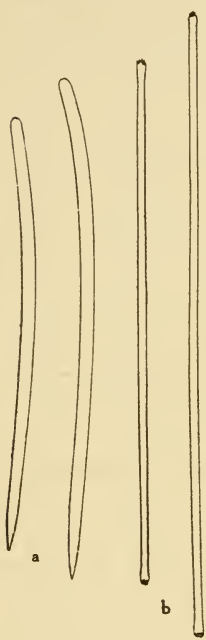


by a relatively very broad layer or wall of collenchymatous tissue, which, to the naked eye, has a somewhat gelatinous and translucent appearance as compared with the surrounding denser tissue. The specimen, which is preserved in alcohol, is of a dull yellowish-white colour; it is of rather soft consistency, and is very easily torn asunder. In the living state, according to the original description, the colour is a bright orange-red, which is more pronounced and intense on the surface than in the interior.

In the body of the sponge, the main skeleton consists of a rather dense and confused, somewhat renieroid, reticulation of single spicules and of spicule-bundles (or short, paucispicular fibres), traversed at close intervals by well-defined, multispicular fibres (usually less than  $50\mu$  in stoutness) running, for the most part, in a surfaceward direction; scattered through the reticulation are raphides, which occur both singly and in bundles. In the processes, however, in correspondence with an increase in development of the multispicular fibres, the reticular component of the skeleton is more or less reduced, and, in their more central region, may occasionally disappear altogether; in the latter case, the skeleton consists almost exclusively of closely approximated, longitudinally-running fibres, the diameter of the stoutest of which may exceed  $200\mu$ . The fibres are everywhere composed of loosely aggregated, parallel styli, together with a small proportion of tylota. Spongin is entirely absent. In the extensively developed collenchyma surrounding the canals, the only skeletal elements are singly scattered raphides and tylota, the former abundant, the latter usually scarce. The ectosomal skeleton consists of closely approximated, slightly divergent, vertical tufts of tylota, with numerous raphides scattered between; the tufts often, though not usually, are prolonged inwards into loose straggling strands (of tylota) connecting with the multispicular fibres of the main skeleton; but in many places, especially where the dermal layer is immediately underlain by collenchyma, a discontinuity exists between the dermal and main skeletons, which is very marked.

Spicules.—(a) The styli are (as a rule, slightly) curved, or rarely straight spicules, of nearly uniform diameter throughout their

entire length except for a distance of about  $5\mu$  (or less) through which they taper to a sharp point; proceeding towards the basal end, however, they usually undergo a slight contraction, and then usually expand again, though only very slightly, at their extremity.



Their length, which very rarely falls below  $160\mu$ , may attain to  $215\mu$ , and, on the average, is nearer to the latter figure than to the former; the diameter of the stoutest is  $6\mu$ .

(b) The tylota are straight or nearly so, with cylindrical or slightly fusiform shaft, and with elongate narrow heads, the extremities of which are truncate, and provided with about a dozen spines, averaging, say,  $2\mu$  long; they range between  $190$  and  $240\mu$ , and are seldom less than  $210\mu$  in length, while their diameter is rarely, if ever, more than  $3.5\mu$ .

Fig. 11.  
*T. digitata* var. *rubicunda*. a, Styli. b, Tylota. (Onychetæ not figured; similar in spinulation to those of *T. digitata* var. *rubra*).

(c) The raphides (onychetæ) are straight, asymmetrically fusiform, stylote, tapering gradually to a fine point at one end and to a truncated extremity at the other; their region of maximum stoutness lies nearer to the latter or basal end. Their base is frequently rendered apiculate by a minute spine situated at its edge, *i.e.*, outside the line of continuation of the axis of the spicule; sometimes there appear to be two such spines. The basal moiety (only) of the spicule is covered with minute spinules, which decrease in size towards the middle of the spicule and, gradually becoming indistinct, finally give place to a scarcely more than perceptible roughness of the surface. The raphides are, at most,  $1.8\mu$  in diameter, and vary in length from  $35$  to  $130\mu$ ; individuals of length between  $60$  and  $90\mu$ , however, are rare, thus indicating a partial differentiation of the spicules into two groups. The smaller raphides are

scarce, except in the dermal skeleton, where their number equals, if it does not exceed, that of the longer ones.

*Loc.*—Port Jackson.

*Remarks.*—In the aggregate of its characters, *T. digitata* var. *rubicunda* appears to be well distinguished from any hitherto described variety of the species, and, in many respects, diverges so widely from the typical form as almost to justify its recognition as an independent species; possibly, however, it may prove to be identical with the insufficiently described *T. digitata* var. *fibrosa*, R. and D., which is recorded from the same locality (Port Jackson). Its chief diagnostic features are the digitate, massive, external form; the well-defined sponginous fibres; the considerable range in length, and partial separation into two groups of the raphides; and the character of the extremities of the tylota.

Hentschel(20), misled by Lendenfeld's description of *Tedania rubicunda*, has briefly described, under that name, a sponge, from the west coast of Australia, in which the dermal spicules are amphistrongyla (apparently with non-spinose extremities), and which, in other respects also, differs markedly from the sponge here re-described.

#### TEDANIA LAXA.

Labelled in Lendenfeld's handwriting "Truncatella laxa"—the MS. synonym of *Tedania laxa*—there are, in all, twelve specimens, eleven occurring together in one jar, and one separately. They vary very considerably in their exact external form, though all are much alike in colour, consistency, and surface-appearance; and all agree in being composed of clustered, usually more or less inter-united, moderately slender branches. Some, for example, have the branches very intimately intergrown and partially fused with one another, in such a way as to give rise to a rather compact reticulate mass, and are thus, as regards external form, apparently in close agreement with the description of the species; whereas others are more erect and arborescent, and include among them several that

exhibit a conspicuous resemblance to the type-specimen of *Stylotella digitata* (= *S. agminata*). While external examination of the specimens afforded no reason to doubt that at least the more massive-looking would be found in complete conformity with the description of *T. laxa*, microscopical examination yielded, in every case, the same result, and showed them to be no more than a series of forms of *Stylotella agminata*. Yet, at the same time, there was presented the very striking coincidence that, in the arrangement of their skeleton and approximate size of their spicules, the specimens actually do agree with the description of *T. laxa*, almost perfectly. In the face of such evidence, a contention that the specimens are other than examples of this species cannot well be sustained; and one has to conclude that *Tedania laxa* is no more than a synonym of *Stylotella agminata*. The probability of the correctness of this conclusion is supported by other considerations, as follows:—According to its description, *T. laxa* differs from *S. agminata* only in the following particulars: the sponge grows to a comparatively large size (nearly twice that of the largest specimen of *S. agminata* in the collection); oscula are not apparent; the colour of the living sponge is bright brick-red; and the spicules, in addition to styli, include tylota, oxea, and rare trichites. But the difference in mere size of the sponges is of very doubtful importance, as also is their difference in colour; the oscula of *S. agminata* are often very difficult to make out (owing apparently to their becoming closed over, as a result of contraction, by the dermal membrane); and there is present, in this species, a small proportion of slender megascleres which, without critical inspection, could very easily be mistaken for trichites. Also, allowance must be made for the fact that, in regard to matters of spiculation, the Catalogue is often seriously at fault; and of especial significance in this connection is the erroneous spiculation ascribed to *Tedania rubicunda* and *T. rubra*. And, finally, it is to be noted that the pattern of the skeleton of *S. agminata* bears no inconsiderable resemblance to that (in certain parts) of *T. rubicunda*, and, indeed, might be described in precisely the same terms as Lendenfeld, in his description of the latter species, employs.

## TEDANIA RUBRA. (Text-fig. 12).

*Introductory.*—Although the specimen which I describe hereunder, is far from satisfactorily agreeing with the original description, yet, as it is labelled in Lendenfeld's handwriting with the name ("Truncatella renieroides"), given in the key-list as the MS. equivalent of *T. rubra*, and as it actually is a *Tedania*, the balance of evidence undoubtedly points to its being a genuine example of the species, and justifies the conclusion that the original description is inaccurate. The latter states, among other things, that oscula are present, which measure 2 to 3 mm. in width; that the fibres consist (only) of spicules; and that the spicules are styli measuring on the average  $200 \times 6\mu$ , tylota, oxea, and irregularly curved, hair-like spicules. In the specimen, on the other hand, there are no evident oscula (though scattered over the exterior, there is a number of small oscula-like openings, due to the presence of operculate cirripedes close beneath the surface); the fibres are composed of spicules cemented and usually also ensheathed by spongin; oxea are entirely absent; the styli measure at most  $205 \times 6\mu$ ; the "tylota" have spined, and scarcely at all expanded, extremities; and the hair-like spicules (spinulous raphides) are almost invariably straight. As an indication of the limited importance attachable to these discrepancies, it may be remarked, firstly, that those in connection with the spiculation are almost exactly the same as have been found to occur in the case of *Tedania rubicunda*, and, secondly, that the actual mistake of describing, as oscula, holes caused by symbiotic cirripedes, was made by Lendenfeld in the case of *Cliona lutea* and of *Spirastrella ramulosa*.

The megascleres (and, at first sight, also the raphides) of *T. rubra* resemble so very closely those of *T. digitata* var. *rubicunda*, that had I examined no more than preparations of their spicules, I should certainly have pronounced the two sponges to be specifically identical; in view of its well-developed spongin-fibre, however, the like of which apparently has not been met with in any other of the numerous known forms of *T. digitata*, it seems necessary that *T. rubra* should be ranked as an independent variety.

*Description.*—The single specimen is a solid massive sponge, of somewhat brick-shaped form (but with rounded angles and partly uneven surface), measuring 55 mm. in height, and 45 mm. by 30 mm. in cross-section; the inequalities of the surface are mostly restricted to the upper aspect of the sponge, and take the form of conical, dome-shaped, or papilliform elevations of small size, the largest (which is of exceptional size) measuring 6 mm. in height, and 5 mm. across at its base. There is a well-developed, non-separable, dermal membrane, with smooth, almost glabrous, surface. Oscula of minute size, certainly less than 0.5 mm. in width, are probably present, and, judging by the direction of the main excurrent canals, occur on the upper surface, generally (though apparently not exclusively) at the summits of the elevations; as, however, the canals are of very small size (being rarely as much as 1 mm. in diameter), and are not traceable, owing to their partial collapse, all the way to the surface, the existence of undoubted oscula could not be demonstrated.

The colour in alcohol is yellowish within, and dull white on the surface. In consistency, the sponge is moderately firm, yet compressible, and, by reason of its fibrous skeleton, is resilient and fairly tough.

The main skeleton is a reticulation of spiculo-spongin fibres between which there lie scattered, without recognisable order and in varying abundance, usually not numerous megascleres and raphides, the latter occurring both singly and in bundles; entering into its composition also, but not contributing to form the reticulation, are occasional (yet constantly occurring) continuous strands of loosely associated, parallel spicules uncemented by spongin. The spicules of the sponginous fibres are styli and tyloa, the latter relatively very scarce except in the ectosomal region; in the asponginous fibres, on the other hand, the tyloa may predominate over the styli, and also a few raphides make their appearance. The scattered megascleres are chiefly tyloa. The skeleton-reticulation consists chiefly of multispicular main fibres (with compact spicule-core, on the average less than ten spicules broad) running irregularly, usually not much more than a spicule's length apart, and



with occasional branching and anastomosis, in a general surface-ward-direction; the connecting fibres, which vary from unispicular to rarely multispicular, occur at rather variable intervals, and, where the main fibres are more widely separated, from between them an irregular inter-reticulation. As the surface is nearly approached, the connecting fibres disappear, and the outwardly-running fibres become split up into numerous closely-arranged and parallel strands of loosely-associated tyloa, ending at the surface, each in a slightly penicillate tuft: in the dermal skeleton thus constituted, there occur in addition to the vertically arranged spicule-strands only a very few scattered raphides. In places—though this seems to be exceptional—the dermal skeleton, while otherwise unchanged in character, appears not to be in continuity with the main skeleton. The extent to which spongin is developed in connection with the fibres, varies considerably in different parts; frequently it forms a quite conspicuous sheath which, in thickness, may exceed the diameter of the spicule-core, the fibre as a consequence attaining sometimes to a stoutness of  $40\mu$  or more; usually, however, it is barely more than sufficient to hold the spicules together; while towards the surface, it further diminishes in quantity and finally disappears. The main excurrent canals are surrounded by a narrow layer of collenchymatous tissue in which the only skeletal elements are scattered tyloa and raphides.

*Spicules.*—The megascleres, as already stated, are hardly distinguishable from those of *T. digitata* var. *rubicunda*—even in size being not materially different. The styli (when full-grown) vary in length from  $155$  to  $200\mu$ , and are at most  $6\mu$  in diameter; the tyloa are never less than  $175\mu$  in length, and attain a maximum size of  $230 \times 4\mu$ . The very slenderest immature tyloa, it was noticed, have the axial canal open at one end, and, at that end, their spines are less advanced in development than at the other.

Raphides (onychetæ) occur of all lengths between  $20$  and  $155\mu$ , but those exceeding  $135\mu$  are scarce; there is also a rarity of individuals of certain intermediate sizes, with the consequence that, roughly, three groups are recognisable, having the following approximate ranges of length: (i.)  $20-40\mu$ ; (ii.)  $55-70\mu$ ; (iii.)

90-155 $\mu$ . Those of the third group are the most abundant, while those of medium size, which are the least frequent, are comparatively very scarce. Besides differing in size, the raphides of the three groups exhibit, as a general rule, certain appreciable differences in other respects also, though all agree in being very gradually sharp-pointed at one extremity, and abruptly truncated at the other, in being more or less spinulose, and in having the spinules pointing in the direction of, and progressively increasing in size

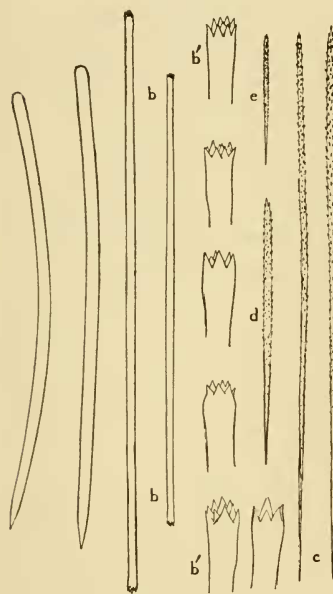


Fig. 12.

*T. digitata* var. *rubra*. a, Styli.

b, Tyloids. c, Onychetae.

towards, the truncated or basal end of the spicule. (i.) The smallest raphides are conical in shape, tapering gradually from base to apex; are spinulose over their entire extent; and are usually much less than 1  $\mu$  in diameter. (ii.) The rather rare raphides of intermediate size are fusiform, with the region of greatest stoutness nearer to the basal end than to the middle of their length; are provided over their whole length with spinules which attain to a larger size than those of either (i.) or (iii.); and are always relatively stout in proportion to their length, their diameter being seldom much less than 2  $\mu$ . (iii.) The longest raphides are slightly fusiform, with the region of greatest stoutness situated nearer to the middle of their length than to the basal end; have a merely roughened surface, or (as a rule, only in the case of the stoutest) are perceptibly spinulose over their basal moiety only; are commonly terminated at their truncated end by a slender spine; and vary in stoutness from less than 1  $\mu$  to slightly more than 2  $\mu$ .

*Loc.*—Port Jackson.

## TEDANIA TENUISPINA.

The specimen purporting to be the type of this species—and, moreover, the only specimen, either in the collection of the Australian Museum or among the fragments received from the British Museum, which is labelled as representing the species—is considerably at variance with the description of *Tedania tenuispina* in regard to its outward form, and departs therefrom also in some other respects,—being, in fact, an example of *Stylotella agminata*. Nevertheless, in skeletal characters it exhibits, on the whole, a very considerable degree of correspondence with that description; and were the specimen but possessed of the external habit ascribed to *T. tenuispina*, one would not hesitate at all to accept it as an example thereof. Accordingly, the question presents itself as to whether the alleged type-specimen should be rejected as wrongly labelled, and as having no relation whatsoever to the species under consideration; or whether the description should be regarded as an erroneous one, combining an account of the external features of one species with that of the internal features of another, the latter species being that which is exemplified by the type-specimen. The evidence is insufficient to enable one to decide positively; but, for the following reasons, I am disposed to give preference to the view that the description confuses two species, one of which is *Stylotella agminata*. In the first place, the external form ascribed to *T. tenuispina* is opposed to the likelihood of its belonging to *Tedania*, inasmuch as the species of that genus appear always to be more or less massive in habit; and it is an admissible assumption, therefore, that the species has been either generically misnamed or else misdescribed in respect of its external characters. Secondly, the description is open to suspicion owing to an apparent incongruity; for, in the paragraph relating to the outward characters of the sponge, it is stated that the surface is “roughened by projecting spicules”—which would seem unlikely except in the case of a sponge having spicules of fair length, say, 0.5 mm. or more; whereas, according to the latter part of the description, the spicules have a length of only 220  $\mu$ . Thirdly, no reliance can be

placed upon the statement that, in addition to styli, "a few tylota and oxea are also found"; for Lendenfeld has erroneously also attributed all these three kinds of megascleres to each of the other three species assigned by him to *Tedania*. Fourthly, the description is not in accordance with Lendenfeld's definition of *Tedania*, inasmuch as it contains no mention of the occurrence of raphides in the species. And, lastly, owing to the doubt which thus attaches to the account given of the spiculation of *Tedania tenuispina*, it is impossible to assert that the ostensible type-specimen is *not* an example of the species upon which the description of the skeletal characters of *Tedania tenuispina* was based, for in other respects, it agrees with that description sufficiently well.

I propose, therefore, to regard *Tedania tenuispina* as practically synonymous with *Stylotella agminata*.

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For Reference List of Literature, see *antea*, pp.310-313.

For Explanation of Plates xv.-xxiv., see *antea*, pp.313-315